

Amendments to the Claims

This listing of claims will replace all prior listings of claims in the application.

Listing of Claims

1.-19 (Cancelled).

20. (Currently Amended) A method for shading a three dimensional textured computer graphic image comprising the steps of:

providing data defining the three dimensional computer graphic image, the image comprising a set of pixels;

providing a set of surface normal vectors corresponding to the texture data for the image wherein, the surface normal vectors are stored in a local coordinate system, and an individual surface normal vector from the set of surface normal vectors is assigned to each pixel;

providing data defining at least one light source and its direction illuminating the image wherein the light source is defined in the same local coordinate system; and

for each pixel in the image, deriving a shading value to be applied to that pixel from the surface normal vector assigned to the pixel and the light source data.

21. (Previously Presented) A method according to Claim 20 in which the surface normal vectors are stored in polar coordinates.

22. (Previously Presented) A method according to Claim 20 in which the light source data are stored in polar coordinates.

23. (Currently Amended) A method according to Claim 20 in which the step of deriving a shading value to be applied to

a pixel comprises deriving a colour value and a blending value from the surface normal vector assigned to the pixel and the light source data and combining ~~this~~ the derived colour value with existing colour data for that pixel in dependence on the blending value.

24. (Previously Presented) A method according to Claim 20 in which the surface normal vectors are stored in Cartesian coordinates.

25. (Previously Presented) A method according to Claim 24 in which the light source data are stored in Cartesian coordinates.

26. (Previously Presented) A method according to Claim 24 in which, for each surface normal vector, only two of the Cartesian coordinates are stored.

27. (Currently Amended) A method according to Claim 20 comprising the step of applying a linear filter to the texture data at least once to map values to the individual pixels.

28. (Previously Presented) A method according to Claim 20 including the step of applying a glossiness parameter to a pixel.

29. (Currently Amended) Apparatus for shading a three dimensional textured computer graphic image comprising:

means for providing data defining the three dimensional computer graphic image, the data defining pixels that comprise the image;

means for providing a set of surface normal vectors corresponding to ~~the~~ texture data applied to the image wherein

the surface normal vectors are stored in a local coordinate system;

means for providing data defining at least one light source and its direction illuminating the image wherein the direction of the light source is provided in the same local coordinate system; and

means for deriving a shading value to be applied to each pixel in the image from the set of surface normal vectors and the light source data.

30. (Currently Amended) Apparatus according to Claim 29, ~~in which~~ wherein said means for providing surface normal vectors provides the surface normal vectors are stored in polar coordinates.

31. (Currently Amended) Apparatus according to Claim 29, ~~in which~~ wherein said means for providing light source defining data provides the light source data are stored in polar coordinates.

32. (Currently Amended) Apparatus according to Claim 29, ~~in which~~ wherein said means for providing surface normal vectors provides the surface normal vectors are stored in Cartesian coordinates.

33. (Currently Amended) Apparatus according to Claim 29, ~~in which~~ wherein said means for providing light source defining data provides the light source data are stored in Cartesian coordinates.

34. (Currently Amended) Apparatus according to Claim 32, ~~in which~~ wherein said means for providing surface normal vectors, for each surface normal vector, provides only two of the Cartesian coordinates are stored.

35. (Previously Presented) Apparatus according to Claim 29 comprising means for applying a linear filter at least once to the texture data to map values onto individual pixels.

36. (Previously Presented) Apparatus according to Claim 29 in which said means for deriving a shading value to be applied to a pixel comprises means for deriving a colour value and a blending value from the light source data and means for combining the colour value with an existing colour value in dependence on the blending value.

37. (Previously Presented) A method of shading a three dimensional graphics textured image comprising the steps of:

- defining a basic computer image to be textured, the computer image comprising a set of pixels, wherein, in said step of defining a basic computer image, an existing color value for each pixel is determined;

- determining whether or not the basic computer image is to be subjected to supplemental shading;

- if the basic computer image is to be subjected to supplemental shading:

- for each pixel in the basic computer image, providing a surface normal vector, wherein the surface normal vectors are in a local coordinate system;

- providing data defining a light source and the direction from which the light source illuminates the basic computer image, wherein the data are in the same local coordinate system as the surface normal vectors;

- based on the surface normal vector for a pixel and the data defining the light source and the direction from which the light source illuminates the basic computer image, generating an alpha value and a supplemental color value for the pixel; and

blending the existing color value and the supplemental color value together as function of the alpha value to produce a final color value for the pixel; and

if the basic computer image is not to be subjected to supplemental shading, designating the existing color value as the final color value.

38. (Previously Presented) The method of shading a three dimensional graphics textured image of Claim 37, wherein:

a store contains a plurality of bump maps, each said bump map comprising a set of surface normal vectors; the surface normal vectors of a bump map varying as a function of the location of the surface normal vectors on the bump map;

if the basis computer image is to be subjected to supplemental shading, one of the bump maps in the store is retrieved and the bump map is mapped over the basic computer image; and

said step of providing a surface normal vector for a pixel is performed by determining which of the bump mapped surface normal vectors is mapped over the pixel.

39. (Previously Presented) The method of shading a three dimensional graphics textured image of Claim 37, wherein said step of providing a surface normal vector for a pixel is performed by retrieving the surface normal vector from a store wherein, in the store, the surface normal vector is stored in one from the following set of coordinate systems: polar coordinate system and Cartesian coordinate system.